Studies on Sensory Deprivation: VI Part 3. Effect of Sensory Deprivation upon perceptual Functions

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PART 3. EFFECT OF SENSORY DEPRIVATION UPON PERCEPTUAL FUNCTIONS

By

HITOSHI UENO (上野 矗) and YUKIO SUZUKI (鈴木由紀夫)

(*Shiraume College, Tokyo*) (*The Institute for Science of Marine Labour, Tokyo*)

Concerning the effect of S.D. upon perceptual function, each of the following hypotheses induced from the previous studies was examined by means of the following tests. Hypothesis 1: S.D. impaires the higher mental function of organizing perception. To verify this hypothesis, size constancy was taken up again. Hypothesis 2: S.D. increases the activity of perceptual function. To verify this hypothesis, binocular rivalry was newly introduced.

Moreover, for the purpose of examining into the selective effect of S.D. upon EEG, electric flicker and Motokawa's method of electric flicker were taken up again. Hypothesis 1 and 2 were intended to be verified experimentally. The results of electric flicker and Motokawa's method of electric flicker were not clear. And it will be an important problem which must be answered by further investigations in future to verify the selective effect of S.D. upon EEG by means of some physiological indices.

Introduction

Purpose: This paper is concerned with the intensive examination into the two hypotheses about the effect of sensory deprivation (S.D.) upon perceptual functions which were induced from the previous studies.

Hypotheses: 1) S.D. impaires the relatively higher function of organizing cognition. (This follows from the result of Bender Gestalt test which indicated higher Z score in Exp. G. than in Cont. G., and from the result of Müller-Lyer illusion test which showed the decrement of the amount of illusion after S.D.)

2) S.D., however, doesn't necessarily make the sensibility to perceptual stimulus dull. (From the experimental results which showed that threshold of two-point descrimination, of taste sensation and of the descrimination of Landolt ring tended to become lower after S.D., and from the result of the progressive weight test which showed the increment of suggestibility after S.D.)

On the first hypothesis: The size-constacy test was taken up again. Its purpose was first to examine the difference in test condition between the dark room in the preceding test and the light room in this study, and secondarily to re-examine the result of the preceding test and its interpretation. The previous results indicated that the size-constancy increases after S.D. The increment of size constancy seemed to mean the weakness of organizing function of perception.

On the second hypothesis: Binocular rivalry was newly introduced. From the previous results it seemed to be inferred that S.D. increases the activity of cortical visual region. And the rate of rivalry seemed to be an index to the approach to its activity. Accordingly, binocular rivalry was taken up.

Moreover, electric flicker and Motokawa's method of electric flicker were carried out again. These tests were employed to examine the selective effect of S.D. upon EEG which was suggested in the study last. That is, the integrated value of EEG revealed that the effect of S.D. was more remarkable in the frontal region than in the temporal and the occipital region.

Method

Size constancy test

Except the test condition of the light room, all of procedures were the same with the previous studies. The distance of subject (S) from Sc was 4m. and that from Ss 2m. Stimulus figure was a square inclined at 45°. The length of the diagonal of Ss was 50 mm. S was asked to match the size of the Sc to Ss. It was presumed that the size constancy would increase after S.D.

Binocular rivalry

Two cards of 30 mm squares, one red, and the other green, were placed upon proper adjustment of the stereoscope rack, so that the two squares exactly coincided in binocular vision. First, a red square was presented to the left eye, and a green square to the right eye. Next, each square was reversed its position. Each observation time was 2 minutes period separated by 2 minutes of the rest. Subjects were instructed to report a fluctuation of the colors observed by them (Whether red was seen, green was seen, or fused color of red and green was seen) with help of pushing switch in the previously promised manner. Their reports were recorded by means of electric recorder.

The score was the number of changes in the observation period. Presumption was that the fluctuation increased after S.D.

Electric flicker and Motokawa's method of electric flicker

Each of these tests was performed under the same procedure as in the previous study.

Results and Discussion

The results of each test are shown in Table 1, 2, 3 and 4 respectively.

Size constancy

The result is shown in Table 1. As presumed, size constancy increased after S.D.

Table 1. The mean of the estimated size of each G. in the size constancy

	Pre-Test	Post-Test	Difference	P
Exp. G. (N=11)	55.4 mm	54.2 mm	−1.2 mm	.10<P<.20
Cont. G. (N=15)	54.1	54.0	−0.1	

Table 2. The mean of the fluctuation of each G. in the binocular rivalry

	Pre-Test	Post-Test	U	P
Exp. G. (N=10)	25.3 times	36.5 times	91	P<.10
	28.9	40.0	96	P<.10
Cont. G. (N=15)	46.7	44.4	99	Non Sig.
	50.6	51.1	106	Non Sig.

Table 3. The mean value of the electric flicker of each G.

	Pre-Test	Post-Test	Difference	P
Exp. G. (N=11)	42.8 cps	42.6 cps	−0.2 cps	.05<P<.10
Cont. G. (N=15)	42.5	41.2	−1.3	

Table 4. The mean value of Motokawa's electric flicker of each G.

	Pre-Test	Post-Test	Difference	P
Exp. G. (N=11)	19.7 △s	22.8 △s	3.1 △s	.40<P<.50
Cont. G. (N=15)	19.0	20.9	1.9	

This result was the same as that obtained in the preceding test. This implies that S.D. brought about the increment of size constancy regardless of the test condition of dark room or light room, and that the interpretation of the previous result was meaningful and valid. The increment of size constancy after S.D. seems to indicate that S.D. causes the dominance of the naive and stimuli-dependent attitude on the part of the subjects when we consider the fact that the size constancy of the uncivilized people and children is higher, the increment of size constancy seems to mean the weakness of organizing function of perception.

Binocular rivalry

As shown in Table 2, the result indicated that the fluctuation tended to increase after S.D., though there was no significant difference in the rate of changes between the Exp. G and Cont. G. It seems to favor the above-mentioned presumption. This

result suggests that S.D. increases the activity of cortical visual region, and brings about the high activity of the perceptual function, for example, the increased sensibility to external stimuli.

The difference in the mean fluctuation between the Exp. G and Cont. G was very large. But the intra-individual rank correlation between the pre-test and the post-test was from .60 to .78 in the Exp. G and from .79 to .94 in the Cont. G. These coefficients mean that the obtained result was reliable.

Electric flicker and Motokawa's method of electric flicker

The results of these tests were not sufficient to verify the selective effect of S.D. upon EEG. And the result of electric flicker did not accord with that of the previous study. Besides, in view of the fact that the present study of EEG. did not check up the selective effect of S.D. upon EEG., the hypothesis about this effect of S.D. upon EEG. and the physiological index to the approach to the effect of S.D. must be further examined.

References

1. Crain, K., Binocular Rivalry: Its relation to intelligence, and general theory of its nature and physiological correlates, *J. gener. Psychol.*, 1961, 64, 259–283.
2. Hariu, T. & Ueno, H., Studies on Snesory Deprivation: II Part 4. With reference to the genetic process of perception, *Tohoku Psychol. Folia*, 1964, 22, 72–78.
3. Suzuki, Y., Fujii, K., & Onizawa, T., Studies on Sensory Deprivation; IV Part 6. Effect of sensory deprivation upon perceptual function, *Tohoku Psychol. Folia*, 1965, 24, 24–29.
4. Suzuki, Y., Ueno, H., & Tada, H., Studies on Sensory Deprivation. V Part 6. Effect of sensory deprivation upon perceptual function, *Tohoku Psychol. Folia*, 1966, 25, 24–30.
5. Ueno, H. & Tada, H., Studies on Sensory Deprivation. IV Part 7. The effect of sensory deprivation upon genetic process of perception, *Tohoku Psychol. Folia*, 1965, 24, 30–34.

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Zusammenfassung

In bezug auf den Einfluss von sinnlicher Entziehung auf die Wahrnehmungsfunktion, wurde jede von den folgenen Hypothesen, die auf Grund der früheren Forschungen aufgestellt werden, durch die folgenden Prüfungen untersucht.

Hypothese 1:. Die sinnliche Entziehung hemmt die höheren Funktionen, die die Anerkennung organisieren. Um sie zu prüfen, wurde auch die Grössenkonstanz gemessen.

Hypothese 2:. Die sinnliche Entizehung verstärkt die Aktivität der Wahrnehmungsfunktion. Um sie zu erweisen, wurde der binokulare Wettstreit neu gemessen. Um die verschiedenen Einflüsse der sinnlichen Entizehung auf das EEG zu prüfen, wurden auch das elektrische Flimmern und das elektrische Flimmern nach Motokawa gemessen.

Hypothesen 1 and 2 wurden bewiesen. Die Ergebnisse des elektrischen Flimmerns und des von Motokawa angegebenen Flimmerns müssen aber wieder geprüft werden.

Es scheint, dass es also eine wichtige, in Zukunft zu lösende Aufgabe bestehen wird, die verschiedenen Einflüsse der sinnlichen Entziehung auf das EEG durch eine physiologische Messung zu prüfen.